

# A PHENOMENOLOGICAL STUDY OF STUDENTS' EXPERIENCES AFTER TAKING UP A DESIGN THINKING-BASED SUBJECT

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**ABSTRACT:** *Technological advancements challenge educators to perform key initiatives to prepare their students to develop 21<sup>st</sup>-century skills and be ready for the world of work and innovation. On the other hand, design thinking has the potential to allow innovative skills to be developed through student collaboration and creativity. Thus, this study examines the students' experiences in their learning and development of 21<sup>st</sup>-century skills after taking up a design thinking-based subject. To provide alignment, the graduate attributes of the academic institution where the students are enrolled were mapped against 21<sup>st</sup>-century skills. Students shared their reflections and realizations through a survey at the end of the semester. Thematic analysis was used to process their responses, and focus group discussions were performed using purposive sampling for validation. Results showed that the students appreciated their learning experiences about the subject. The students have also realized the importance of and embraced the development of their 21<sup>st</sup>-century skills like critical thinking, innovative thinking, resilience, empathy, teamwork, and communication.*

**Keywords:** *design thinking, 21<sup>st</sup>-century skills, graduate attributes, constructivism*

## 1. INTRODUCTION

Design thinking (DT) is an engaging problem-solving process that requires creativity and analysis. It allows individuals to experiment, prototype, and redesign ideas based on collected feedback [1]. Design thinking is conducive to developing students' innovative mindsets [2] and unleashing their creative potential through knowledge transfer [3]. DT is found to be helpful in teaching 21st-century skills because of its activities where participants deal with creative problem-solving, collaborate, analyze information, and iterate solutions based on real-world problems and authentic feedback [4]. DT can also assist students in achieving the graduate attributes of any academic institution, which include creativity, innovation, and problem-solving [5]. In the Philippine context, very few studies have been conducted on fully embracing design thinking in educational curricula [6]. The proper integration of design thinking processes with educational standards and academic content has received minimal attention. This connection needs to be established to ensure that design thinking as a teaching-learning approach is relevant to the existing curricular framework in K-12 and higher education [7]. DT is usually conducted through short-term training workshops or short modules, usually taking hours, two days, or a week, depending on the context or goals at hand [8]. This is considered a short-term exposure. There is a gap where these may lead to good engagements, but the impact is very minimal and only lasts for a short time for the learners [9]. Very few studies have been conducted to investigate the lived experiences of students after taking up a design thinking-based subject for a longer period (the whole semester) than the conventional short-term exposure in training. Moreover, very few studies have focused on senior high school students and on those students from the STEM (science, technology, engineering, and mathematics) track. From these, the subject of Design Thinking was created and offered to USTP SHS STEM students as an innovative approach and an initiative to help students develop 21st-century skills aligned with the university's graduate skill attributes. Based on Section 6 of Republic Act 10919, the University of Science and Technology of the Southern Philippines (USTP) Act, Senior High School is strategically

offered to serve as a feeder to the science and technology courses of the university.

This study is performed because very few researchers have tackled the question of whether a design thinking subject has been instrumental in the 21st-century skills or graduate attributes' development of students based on their lived experiences and realizations.

## 2. LITERATURE REVIEW

### Design Thinking

The design thinking process emphasizes empathy, the call to explore human needs, and the inspiration to create innovative solutions [10]. Based on Stanford's school, the 5 phases of the DT process are: empathize, define, imagine, prototype, and test. These phases can also be simplified into four phases: sense, empathy, ideation, and prototype [11]. Design thinking develops students' innovative mindsets and teaches them how to be mentors, create user-centered learning experiences, and share their experiences as developing professionals [2]. Design thinking meets the crucial criteria of facilitating interdisciplinary projects and approaching complex phenomena in a holistic constructivist manner, thereby promoting effective 21st-century learning and skill development [3]. Included in the 21st-century skills are critical thinking, innovation, collaboration, communication, flexibility, and adaptability [12]. These 21st-century skills are expected to benefit the students' future careers [13] and their journey to becoming successful professionals in the industry [14].

### Challenge of Students Developing 21<sup>st</sup> Century Skills and Graduate Attributes

Academic institutions are now more compelled to respond to the emerging needs of the industry, devise and adapt new strategies to foster educational innovation [15] and prepare their students to develop 21st-century skills [16]. They are to reflect what skills are needed by the industry to avoid job-skill mismatch and to increase the chance of their graduates' employability and job-skill competencies [17]. Thus, the curricula in Philippine schools today must be geared in response to the rapidly changing technology and society [18]. Schools also identify graduate attributes as a guide for what specific skills and competencies are expected from their

**Table 1: Mapping the alignment between USTP Graduate Attributes and 21<sup>st</sup> Century Skills**

USTP Graduate Attributes	21 <sup>st</sup> Century Skills: Learning and Innovation Skills		
	Creativity and Innovation	Critical Thinking and Problem Solving	Communication and Collaboration
Innovative Thinking	X	X	
Critical Thinking	X	X	X
Resilience	X		
Empathy	X	X	X
Teamwork and Collaboration	X		X
Communication	X	X	X

USTP Graduate Attributes	21 <sup>st</sup> Century Skills: Info Media and Tech Skills		
	Information Literacy	Media Literacy	ICT Literacy
Innovative Thinking			
Critical Thinking	X	X	X
Resilience			
Empathy	X	X	X
Teamwork and Collaboration		X	
Communication	X	X	X

USTP Graduate Attributes	21 <sup>st</sup> Century Skills: Life and Career Skills		
	Flexibility & Adaptability	Initiative & Self-Direction	Social & Cultural Skills
Innovative Thinking			X
Critical Thinking		X	X
Resilience	X	X	
Empathy	X	X	X
Teamwork and Collaboration	X		X
Communication	X	X	X

USTP Graduate Attributes	21 <sup>st</sup> Century Skills: Life and Career Skills	
	Productivity & Accountability	Leadership & Responsibility
Innovative Thinking		
Critical Thinking	X	X
Resilience	X	
Empathy	X	X
Teamwork and Collaboration	X	X
Communication	X	X

students during their learning journey in the academic institution. Students developing these graduate attributes is a challenge for any academic institution to facilitate and assess

[5]. Based on the P21 Framework Definitions, critical thinking, innovative thinking, resilience, empathy, teamwork, and communication are contextually considered 21st-century skills. These six skills are also graduate attributes of USTP [19]. Table 1 shows a matrix for mapping the alignment between 21st-century skills and USTP graduate attributes. Mapping is done by looking at each USTP's graduate attribute's respective characteristic definitions and details.

**Key Activities in Design Thinking**

Design thinking offers 21st-century learning in a holistic constructivist manner [2, 3]. Constructivism means that learning is constructed by being active, is a social activity, is contextualized, and needs motivation [20]. With this, design thinking allows students to be motivated to explore knowledge, empathize with others, face risks or failures, work in teams, and share creative ideas [3]. Table 2 shows learning constructivist tenets and their corresponding descriptions based on the study of Pande and Bharathi as they develop a learning approach relating DT and constructivism [20].

**Table 2: Constructivist tenets and descriptions**

Constructivist Tenets	Tenet Description
<b>Creating new knowledge</b>	Ability to seek out and generate new knowledge
<b>Social Interaction and Pluralism</b>	Ability to enhance learning through collaboration and diverse thought process
<b>Personal Autonomy</b>	Ability to feel in charge of the learning process through intrinsic motivation
<b>Optimize Known Knowledge</b>	Ability to effectively utilize and build on existing knowledge to foster new learning
<b>Big Picture</b>	Ability to get a mental model or macro view of any problem or situation
<b>Authentic Tasks</b>	Ability to think meaningfully through tasks or activities that are based on facts
<b>Foster Learner's Thinking</b>	Ability to provide a conducive environment to develop reflection and metacognition
<b>Encourage Ideation</b>	Ability to trigger new ideas, encourage ideas from others, and build on already-generated ideas
<b>Experiential Learning</b>	Ability to develop multiple perspectives, understand primary concepts, contextualize situations, actively engage in learning and experience
<b>Personal Relevance</b>	Ability to orient one's learning in achieving personal goals that are core to one's belief
<b>Shared Experience</b>	Ability to learn and gain knowledge by being part of a diverse group
<b>Adaptive Cognition</b>	Ability to cognitively engage through multiple perspectives including metacognitive, motivational, and behavioral

Iteratively, the key activities in design thinking to be performed are creating own designs, interviewing people identified as target users, deep problem finding, empathy mapping, users' journey mapping, ideation, prototyping, presentation of solutions, and brainstorming or idea generation [20].

### 3. METHODS

This study is qualitative research with a phenomenological design.

The design thinking-based subject was offered during the first semester of the academic year 2023-2024 to all enrolled Grade 11 senior high school STEM students at USTP. The specific name of the DT subject is "Introduction to Innovating Technology Solutions," or IITS. There were 5 Grade 11 SHS class sections. A total of 175 students took up the subject. After completing the IITS subject at the end of the semester, the students responded to an online survey using Google Forms. The following are the questions in the survey:

**“What are your key reflections or realizations that you feel worth sharing after finally completing the IITS subject?”**

After all students had responded to the online survey, the researchers collected all responses from the Google form and performed conventional thematic analysis. Using purposive sampling, Focus Group Discussions (FGD) were conducted afterward to validate the students' responses to the survey. Four students from each section were purposely chosen by their respective IITS instructors to participate in the FGD. Two of these four participants belonged to those who showcased excellent performances in the subject, while the other two were from those who delivered poor performances as perceived by their respective IITS instructors. A total of 20 students participated in the FGD. The researchers used a validated Structured Interview Guide (SIG) during the focus group discussions with the students. Formal letters of invitation were given to the selected participants beforehand for them to confirm their participation. The researchers also got formal written consent from each participant to confirm their willingness to join the FGD and that audio recording will be permitted to document the activity and for record purposes. Confidentiality of the student's responses was also emphasized beforehand by the researcher to protect the identity of the students and as part of ethical considerations in research. Five sets of FGD were performed. Each set has four students as respondents. To minimize bias during the facilitation of FGD, the researchers strictly followed the validated Structured Interview Guide.

### 4. RESULTS

The following results from the thematic analysis of the students' responses to the online survey. Themes and narratives are presented. These are supported and validated then by relevant verbatim of the respondents from the Focus Group Discussions performed.

**Theme 1 and Narrative: Critical Thinking is very important:** It is a good approach to combine generated ideas with others, improve them along the way, and eventually select the best possible set to solve the problem.

**Respondent 2:** *“Learn from your teammates. Share and challenge each other's ideas to explore new ideas.”*

**Respondent 7:** *“You should listen to the ideas of your teammates. They have very good ideas also. Lead and take the initiative. You might be surprised with what they can do when you combine your ideas.”*

After completing the DT subject, the students find meaning in their experiences of brainstorming activities by realizing that developing critical thinking is very important and useful in the world of innovating solutions and learning [21]. These allowed them to appreciate the mindful process of sharing ideas with others [22] towards the generation of better ideas or solutions [23].

**Theme 2 and Narrative: Innovative Thinking should be embraced.** Ideas shared by everyone during brainstorming to solve a problem are all valid in terms of creative potential and capability of producing an innovative output solution. The journey towards innovation is not perfect and is constantly changing, which challenges innovators to always keep up and adapt along the way.

**Respondent 1:** *“Just always give your best. Think outside the box and work well with your teammates to get the best possible outcomes. Follow all the steps. Always express your ideas, not only for yourself but also for your teammates.”*

**Respondent 17:** *“Solving problems with innovative solutions is never instant. It will always take time. It is not going to be easy. It is a trial-and-error process. It takes patience and discipline.”*

After completing the DT subject, the students find meaning in their experiences of ideation activities by realizing that innovative thinking should be embraced even though it is quite challenging to perform [24]. These allowed them to appreciate the value and creative potential of any idea towards innovating a solution for a problem [25, 26].

**Theme 3 and Narrative: Resilience needs to be practiced.** Failures are always part of learning in an educational journey toward innovation. They can be mistakes, rejection, or negative feedback from others about what you and your team are doing or presenting. It is very good to embrace them wholeheartedly, knowing that you can learn from them and that they will help you improve along the way. The path to innovation is not always smooth. You need to have grit and remain optimistic along the way.

**Respondent 6:** *“Always be positive. Failures are part of the process. Accept all the feedback others give you about your innovative solution and be optimistic. It is okay.”*

**Respondent 18:** *“It is okay not to be okay. There will be instances when your ideas will be rejected. There will be times when there will be disputes in your group. Bear with it. There will also be times when during pitching you will have negative feedback. But you will learn from all of these.”*

After completing the DT subject, the students find meaning in their experiences of failures, rejections, negative feedback, and conflicts by realizing that resilience needs to be practiced regularly [25, 27]. These allowed them to realize that optimism and grit will help them continue their journey towards innovating solutions [28].

**Theme 4 and Narrative: Empathizing is very important.** Empathizing with others is very important if we want to understand them deeply. Different people have diverse personalities and backgrounds. Knowing that these people are the target users of a problem, we have to see things from their perspective to interact better with them and help them through an intervention or an innovative solution.

**Respondent 9:** *“The most important part is being empathetic. Work with your team and take the initiative to share ideas*

and foster learning. Adapt to your teammates' or other people's personalities."

**Respondent 12:** "Do not always overthink or think too much about the future. Just focus on the moment and always think about the target users. Always think deeply about your target users' problems. When designing your solution, always consider how the users will experience your proposed solution. Simulate and expect changes along the way."

After completing the DT subject, the students find meaning in their experiences of empathizing with other people by realizing that empathy is very important in designing innovative solutions [22]. These allowed them to see things from different perspectives and not be judgmental of the people around them [21].

#### **Theme 5 and Narrative: Teamwork and Collaboration should be embraced**

We need to do our share when working with others willingly. To accomplish team goals, we need to ensure that everyone cooperates, helps each other, understands each other's perspectives, and maintains good and strong relationships with one another. These can help generate better output and performance.

**Respondent 3:** "Be comfortable enough with working with your teammates. Because if there is already comfort, communicating and accomplishing things with each other will be way easier."

**Respondent 5:** "Always provide help to your teammates. Your teammates need you. Create a strong bond. Stop slacking off or being lazy."

After completing the DT subject, the students find meaning in their experiences of collaborating with other people by realizing that teamwork needs to be embraced, which leads to better innovative outputs [29]. These allowed them to develop better relationships with others and participate more actively in team activities [29, 30].

#### **Theme 6 and Narrative: Communicating ideas is very important.**

It is very important to share our ideas. An idea only becomes valuable after it is shared with others. Getting used to speaking up your ideas more frequently to others benefits you and others.

**Respondent 11:** "Do not be afraid to share your ideas. Who knows what these ideas can do when shared? Share."

**Respondent 4:** "Communication is the key in IITS. I say that all stages in DT and activities need communication. There is no stupid idea, useless skill, or impossible solution."

After completing the DT subject, the students find meaning in their experiences of sharing ideas with other people, realizing that communication is very important in developing innovative solutions [29]. These allowed them to develop creative confidence in their ideas when sharing them with others [24, 29].

#### **Theme 7 and Narrative: IITS is a Very Good Subject:**

It is a holistic subject that provides an innovative experience for students, helping them develop important skills that are worth sharing with others. It also supports students in developing key skills that can be useful in the world of innovation.

Respondent 14: "In IITS, you are expected to leave your comfort zone. It is not a bad thing. You are expected to know

more about your capabilities. It helps you discover things, grow, and mature with yourself."

Respondent 15: "IITS is very useful not only as a student but also especially when you look for a job soon. It teaches you skills like social communication, empathizing, and solving problems with innovation."

Respondent 13: "IITS promotes teamwork and public speaking. It allowed us to develop initiatives, communication skills, and critical thinking."

After completing the DT subject, the students find meaning in their experiences of completing the Design Thinking subject by realizing that DT allowed them to develop their innovative skills and embrace its importance [23, 29].

## **5. CONCLUSIONS**

Based on the results, the students realized that skills like critical thinking, innovative thinking, resilience, empathy, teamwork and collaboration, and communication are very important and need to be embraced or developed because they have the advantages of improving oneself and are very useful in the world of innovation. Additionally, the students also realized that the design thinking-based subject, IITS, is a well-designed subject that gives them an engaging learning experience and is very good to take up because it helps them develop important skills towards innovation. In conclusion, the design thinking-based subject is effective and instrumental in helping students realize the need and importance of developing and improving their expected graduate attributes aligned to 21st-century skills.

## **6. RECOMMENDATIONS**

Based on the results and conclusions of the study, the following recommendations are offered:

1. The university administrators are encouraged to propose a policy to include the design thinking-based subject, (IITS) Introduction to Innovating Technology Solutions, in all of its offered baccalaureate programs, knowing that it can help students develop the university's graduate attributes.
2. Faculty from other universities and colleges are encouraged to perform similar research to explore further the potential benefits of utilizing and incorporating design thinking in the curriculum and how it synergizes with other 21st-century skills.

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